



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Joseph HAYDEN et al.

Examiner: Hemang SANGHAVI

Serial No.: 09/536,460

Group Art Unit: 2874

Filed: March 28, 2000

Title: ATHERMAL OPTICAL COMPONENTS

REPLY

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The following is responsive to the office action of March 24, 2004.

The remaining non-allowed claims (1, 3-5 and 34-36) recite silver chloride or cesium bromide surfaces having a surface figure of < 200nm.

It appears to be the examiner's position that it would be obvious for a skilled worker to utilize such a surface figure for essentially any optical material. The examiner mentions an alleged lack of criticality as to this surface figure and its alleged lack of solving any stated problem.

Firstly, applicants incorporate by reference their previous comments with respect to Hares and Downing, including the fact that in order for the recited surface figure to be obvious for employment in conjunction with surfaces of silver chloride or cesium bromide, there must be some reason in the prior art motivating a skilled worker to employ such a low surface figure instead of some other surface figure. There is no such reason.

In any event, the surface figure in fact is related to a property recited in the specification, as the examiner finds relevant. Note, e.g., on page 6, lines 19-21, a discussion of desired values for the parameter, $(\Delta nL/(nL \cdot \Delta T))$. As noted, this parameter should be less than about $1 \times 10^{-4} K^{-1}$. The surface figure recited in the claims relates specifically to solving the problem of how to achieve this feature of the invention.

If, for example, there were an athermal optical element of a standard thickness such as 2mm (0.2 cm), a maximum "peak" or "bump" of 200nm (permitted by the surface figure) would represent an optical path change of $(0.2+0.00002) \times (\text{index of refraction ("n")})$. See, e.g., page 1, lines 13-15 for the definition of optical path length. For $n=2$ of silver chloride, for example, this amounts to an optical path length at the peak of surface roughness of 0.40004cm. The nominal optical path length is 0.4cm (0.2 x 2). The resultant difference in optical path length, of course, is 0.00004cm.

As the specification makes clear, a field of interest generating these requirements is the telecommunications industry which utilizes lasers in transmission of data. Such lasers can produce localized heating. Localized heating can produce local bumps. In an athermal optical element as claimed, one would want the resultant heat-induced roughness to be on the same order as the roughness of the unheated surface so that there is no adverse effect. The claimed feature of a surface figure of <200nm (permitting, as calculated above, an optical path length difference of up to 0.00004cm) means the desired property of $(\Delta nL/(nL \cdot \Delta T))$ will meet the stated $1 \times 10^{-4} K^{-1}$ value as long as the heat-induced "bump" is achieved by not less than a one degree temperature change.

Furthermore, applicants are not aware of any basis for the examiner's allegation that a skilled worker would have found it desired to achieve the recited surface figure to provide "an efficient long

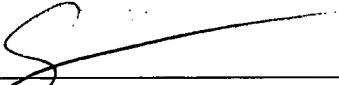
life laser." No basis for this allegation is known. Applicants question which type of lifetime is referred to.

As to the references discussed on pages 5 and 6 of the office action, it is noted that the two Conzone references are not available as prior art. US 2002/0192422 was filed after the filing date of the above-identified application; USP 6,652,972 has the same inventive entity as this application and is not published more than one year prior to this application. Moreover, Dexter has nothing to do with silver chloride or cesium bromide and, like Hares and Downing, provides no motivation to prepare optical elements of such compounds with the requisite surface figure.

It is again respectfully submitted that this application is in condition for allowance.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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